Reflexive Aero Structures for Enhanced Survivability, Phase II

Completed Technology Project (2005 - 2008)

Project Introduction

Cornerstone Research Group Inc. (CRG) will develop an advanced reflexive structure technology system to increase the survivability of future systems constructed of lightweight composite structures. Application of this innovation will apply to a broad selection of high performance systems ranging from aircraft and spacecraft to habitats for space stations and interplanetary exploration. The control system for the reflexive structures will mimic the pain withdrawal-reflex on which the human body relies. This is important because rapid response is critical to survivability. The proposed reflexive system will incorporate a continuous health and performance monitoring system via embedded piezoelectric sensors, an adaptive composite structure based on CRG's shape memory composite material (Veritex

TM

), and an intelligence system which will be interfaced with both the health/performance sensors and the adaptive structure. When activated, the adaptive composite will recover its structural integrity via shape recovery and a novel healing process. The development of a reflexive structural system will enable increased safety and security and demonstrate a better understanding of integrated performance systems.

Anticipated Benefits

Potential NASA Commercial Applications: Government systems that would derive the same benefits would include but not be limited to military and commercial aircraft operated by the Department of Defense (DoD), commercial airlines, and the general aviation community. This technology's attributes for active sense and respond structural recovery should yield a high potential for private sector commercialization for active structural health monitoring and management in several types of space-based and terrestrial structural systems. Lockheed Martin, Boeing, and Vought Aircraft Industries have documented their interest in this commercialization opportunity.

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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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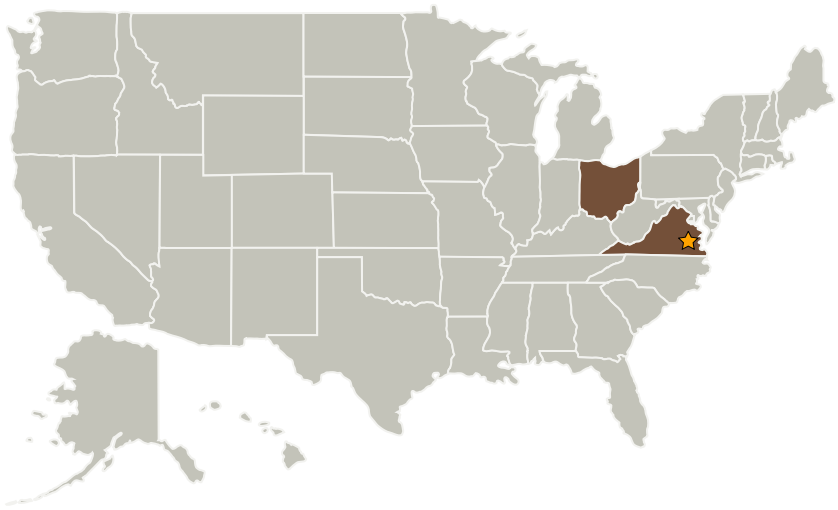
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Cornerstone Research Group, Inc.	Supporting Organization	Industry	Miamisburg, Ohio

Primary U.S. Work Locations	
Ohio	Virginia

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Benjamin A Dietsch

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.2 Structures
    - TX12.2.3 Reliability and Sustainment